

ESTIMATING OTHER EROSION

Annual soil loss predictions for planning purposes are made with RUSLE, the WEQ, or both. Erosion that is seasonal and caused by concentrated flow is not predicted by either of these methods. Detailed criteria for distinguishing rills, ephemeral gullies, and gullies are given below. Differentiating among them still may require careful judgement. This is especially true where an ephemeral gully results from runoff that follows tillage marks rather than natural depressions.

Definitions

Rills: Rills may be any size but are usually less than four inches deep. Rills have one or more of the following characteristics:

- generally parallel on a slope, but may converge.
- generally of uniform spacing and dimension.
- generally appear at different locations on the landscape from year to year.
- generally shorter than ephemeral cropland gullies.
- usually end at a concentrated flow channel, a terrace, or an area where the slope flattens and deposition occurs.
- are on the same portion of the slope that is used to determine the length of slope factor (L) for the RUSLE.
- rill erosion is considered in the RUSLE calculations.

Ephemeral Gullies: Ephemeral gullies may be of any size but usually larger than rills. They have one or more of the following characteristics:

- recur in the same area each time they form rather than randomly at different places on the slope.
- frequently form in well-defined depressions in natural drainageways.
- tend to occur in the upper reaches of a drainage network, where average slopes are greater.
- are usually branching, but may have other patterns caused by row alignment or other characteristics of field operations.
- generally wider, deeper, and longer than the rills on the field.
- occur in depressions into which rows or tillage marks lead.
- form along sloping rows or tillage marks.
- partially or totally erased and filled by tillage operations. The filling results in soil deterioration over a larger area than the gully itself.
- occur on terraced fields where overtopping of the terraces occurs or where piping occurs below the terrace embankment.
- occur in the bottom of gradient terraces.
- ephemeral gullies are not calculated by the RUSLE.

Gullies: Permanent gullies are channels too deep for normal tillage operations to erase. Special operations are required to fill them. Gullies also have one or more of the following characteristics:

- may grow or enlarge from year to year by head cutting and lateral enlarging.
- may also occur in depressions or natural drainageways.
- may begin as ephemeral gully that was left in the field and not erased by tillage or other operations.
- may become partially stabilized by grass, weeds, or woody vegetation.
- gully erosion is not calculated by the RUSLE.

The soil loss from concentrated flow, gullies, and other similar types of erosion can be determined by calculating the volume of soil removed from the eroded area. The tons of soil loss can then be determined by multiplying the volume removed by the unit weight of soil. If the time period of the erosion exceeds one year, the quantity should be divided by the number of years the gully has existed to get an average annual rate.

The following table provides a guide for approximate unit weight of various soils that can be used in the absence of better data.

APPROXIMATE UNIT WEIGHT ^{1/}	
Soil Textural Class	Dry Density lb/ft. ³
Sands	95
Loamy sands	85
Sandy loam	
Fine sandy loam	
Loams	75
Sandy Clay loams	
Sandy clay	
Silt loam	
Silty clay loam	
Silty clay	
Clay loam	
Clay	

Ephemeral or Newly Formed Gully Calculation:

To calculate the erosion occurring from ephemeral gullies or gullies, the following formula will be used:

$$\frac{\text{Cross sectional area} \times \text{Length} \times \text{Soil Weight}}{2000 \times \text{number of years}} = \text{Tons of Soil Lost}^{2/}$$

- ^{1/} Data and estimates from published soil surveys, laboratory data, and soil interpretation records are to be used where available. Parent materials, soil consistency, soil structure, pore space, soil texture, and coarse fragments all have an influence on unit weight. (Example - Bulk density on the soil interpretation sheet listed in gm/cm³ multiplied by 62.4 = lb/ft³.)
- ^{2/} Ephemeral gully erosion may reform several times per year and sometimes does not form during a year. The voided volume which would be calculated after a runoff event would not necessarily be representative of the annual rate but would represent only the specific event. This erosion can be calculated for individual storms and can be summed for a yearly estimate.